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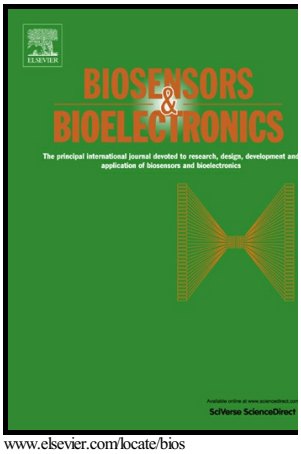

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Synthetic biology and biomimetic chemistry as converging technologies fostering a new generation of smart biosensors

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Abstract

Biosensors are powerful tunable systems able to switch between an ON/OFF status in response to an external stimulus. This extraordinary property could be engineered by adopting synthetic biology or biomimetic chemistry to obtain tailor-made biosensors having the desired requirements of robustness, sensitivity and detection range. Recent advances in both disciplines, in fact, allow to re-design the configuration of the sensing elements - either by modifying toggle switches and gene networks, or by producing synthetic entities mimicking key properties of natural molecules.

The present review considered the role of synthetic biology in sustaining biosensor technology, reporting examples from the literature and reflecting on the features that make it a useful tool for designing and constructing engineered biological systems for sensing application. Besides, a section dedicated to bioinspired synthetic molecules as powerful tools to enhance biosensor potential is reported, and treated as an extension of the concept of biomimetic chemistry, where organic synthesis is used to generate artificial molecules that mimic natural molecules. Thus, the design of synthetic molecules, such as aptamers, biomimetics, molecular imprinting polymers, peptide nucleic acids, and ribozymes were encompassed as "products" of biomimetic chemistry.

Keywords: biosensor, synthetic biology, biomimetic chemistry, rational design, bioinspired molecules

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